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LABOR-MAKING MACHINERY

AN ESSAY

READ BEFORE THE CHICAGO PHILOSOPHICAL SOCIETY,
APRIL 12, 1879

BY

FRED. PERRY POWERS

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LABOR-MAKING MACHINERY.

When an inventor proposed to Colbert, the minister of Louis XIV, a machine which would do the work of ten men, Colbert replied, "I am anxious that men should be able to live honestly by their work, and you propose to me to take the work out of their hands. Take the invention, if you please, somewhere else."

When, in 1838, Walter Hunt was trying to invent a sewing machine, his wife protested that it would throw all the sewing women out of employment, and, as a matter of humanity, Mr. Hunt threw his model away.

When Arkwright's jenny was introduced the English spinners destroyed it, and the weavers did as much for Cartwright's loom. Lace machines were destroyed when introduced into Nottingham, and the journeymen tailors of London resisted the introduction of sewing machines. And only last summer an Ohio farmer found attached to his reaping machine a warning not to use it, which was signed "Bread or Blood."

The workmen in these cases who resisted the introduction of machinery may have had some apparent justification. The silversmith at Ephesus was not so much disturbed at St. Paul's impiety as he was at the fact which he proclaimed to his fellow-silversmiths, that "Our craft is in danger."

But in the case of Colbert and the Hunts the difficulty was of a radically different character. They acted from motives of disinterested benevolence. They were in error, and their error was their failure to comprehend that the wants of man are insatiable. But that is the fact which the entire history of man has demonstrated. No sooner is one want satisfied than man becomes conscious of another want. This is universal among all those classes of men whom it is important for us to consider at this time. Physical wants being satisfied, man becomes conscious of intellectual wants. The necessities being once secured, the comforts are desired, and if a man's entire ability to labor is not consumed in supplying himself with necessities and comforts, then he will devote what surplus time and strength he has to the work of obtaining luxuries. So long as man can by labor supply his wants, so long he will labor to the extent of his ability. And the more easily his wants are supplied, the more wants he will supply. Colbert did not understand this. In satisfying his wants, A affords employment, let us say, to B, C, D, E and F. If by machinery the productive capacity of those men could be increased twenty-five per cent., then the wants that five had been employed to supply would be supplied by four. Colbert supposed that A would want no more, and that F would be thrown out of employment. Experience has demonstrated that this is wrong; that A being able to supply his old wants with the labor of four men instead of five, employs F in supplying some new want. The civilized man differs from the savage only in having developed and satisfied a greater number of wants.

When my grandfather went to housekeeping he purchased a clock by chopping fifty-three cords of wood at one dollar a cord. To-day anyone can procure a clock with a few hours' labor. We do not waste in idleness the time thus saved, but we satisfy more wants, and in doing so employ men in a score of trades that were not dreamed of a century ago, without injuring the old trades. The clockmakers in this country numbered 1,181 in 1850, and 1,779 in 1870.

My purpose is to show that the introduction of labor-saving machinery—so-called—has resulted in increasing the field of employment instead of decreasing it, and in bettering the condition of the laboring classes. And I wish to clear the way for this by calling attention to some grotesque misrepresentations of this matter in Mr. W. Godwin Moody's pamphlet, entitled "Our Labor Difficulties; The Cause and the Way Out." This pamphlet embodies the paper read by Mr. Moody before the American Social Science Association in May, 1878.

Mr. Moody refers to the amount of work done in the printing office of *The New York Tribune*, and then says:

"To do this work requires eighty compositors and proof-readers, four pressmen and two presses—two of Hoe's perfecting presses. To issue the same amount of printed matter by the processes in use by our fathers would require 267 presses, 534 pressmen, and 5,000 compositors and proof-readers. Thus we see that, in printing to-day, less than 100 men with machinery will do the work that would have required nearly 6,000 about fifty years ago. Here in one newspaper establishment labor-saving processes have, within half a century, taken the work from more than 5,500 men."

Like a good many dispatches during the war, this is important if true; but it isn't true. Did *The Tribune* ever employ nearly 6,000 men? If these more than 5,500 men never had the work, how can labor-saving machinery have taken it from them? Machinery has increased the product; it has not reduced the number of persons employed. Does Mr. Moody suppose that had the steam press never been invented *The New York Tribune* would now be issuing its myriads of sheets at four cents a copy, and paying living wages to nearly 6,000 employés. The idea is preposterous. Probably no newspaper previous to the invention of the steam press employed even 100 compositors and pressmen. When we think of type-making, and press-making and paper-making it is apparent that the application of steam to printing has vastly increased the number of persons employed in the trade.

The newspapers and periodicals in the United States numbered 2,526 in 1850; 5,871 in 1870, and 8,133 in 1878. Many of these periodicals have been growing in wealth and increasing the amount of labor employed by them. Is machinery reducing the field of labor in this branch of industry?

Mr. Moody then draws this indictment against labor-saving machinery. He says:

"In San Francisco its hills, covering miles of territory, have been removed by labor-saving processes. The steam paddy, controlled by two men, digs down and removes the hills at the rate of two or three scoops to the car-load, and then in trains of a dozen or more cars are run to and dumped into the bays and hollows to be filled; compelling thousands of muscular workmen with their picks and shovels, horses and carts, to find other employment."

Now there is nothing whatever in this statement unless it be assumed that this removal of hills covering miles of territory would have occurred any way, and that but for the steam paddy the work would have afforded employment to thousands of laborers and their teams. Labor has always been scarce and high on the Pacific coast, and it is safe to presume that the possibility of doing that work by steam was the condition of its being done. If that is so, then the steam paddy has thrown no one out of employment, but has provided work for the few men required to construct it, tend it, and to transport the earth.

To subtract the number of men now employed on a piece of work from the number that would be employed if the same work were done by hand is the most fallacious of all methods of ascertaining the effect of machinery. It assumes that the same amount of work would be done, if it had to be done by hand, that is now done by machinery. Reason and observation teach us that this assumption is false, and that the present cheapness is the condition of the present amount of work.

For instance, by hand a man could clean four or five pounds of cotton a day. It is now done by machines which clean 4,000 pounds a day each. To clean one of our recent crops by hand would require the continuous labor of 1,200,000 or 1,500,000 men the year round. Have those men been thrown out of employment? Certainly not. They never had it, and they never would have had it, because cotton could never have become a great staple had the work of cleaning it been so great. It wouldn't have been profitable. It is probable that the cotton gin has actually increased the number of persons employed in cleaning cotton. In view of the number of persons employed in cultivating, transporting and manufacturing cotton, it is quite certain that the cotton gin has enormously increased the field of labor.

Again, take the corn crop. To shell the corn crop of 1877 by hand, at the rate of five bushels per man per day, would have required the labor for one year of over 860,000 men. Just think of the degree to which it would enhance the price of corn unless the men employed in shelling lived like the fellaheen of Egypt ! The best shelling machine with two men will shell 1,500 bushels a day. Less than 6,000 men would shell the entire crop. Have 854,000 men been thrown out of employment by the corn sheller ? Such a question needs no answer. Agricultural machinery has enabled us to vastly increase our crops ; it has not compelled men anxious to work to stand idle. As was humorously said by Mr. C. C. Coffin before the Congressional Committee on patents, it would require the entire farming population of the six great corn states to sit astride barn shovels and handles of frying pans 100 days out of 365 to shell their corn by the old processes.

Mr. Moody falls back into his regular mistake when he uses the following language :

" It must not be forgotten that wherever machinery has been introduced as a tool or force to do a certain amount of work of any kind, it simply displaced the tools formerly used, which in the aggregate were far greater in number, and required much more muscular labor in the making than the machines which have displaced them ; as for instance, the carts, wagons, coaches and teams displaced by the locomotive and cars."

The trouble with this is, that the amount of work to be done isn't "certain;" it is uncertain and it increases rapidly as machinery is introduced. Are there fewer carts, wagons, coaches and teams in this country now than there were in 1830? I have no statistics on this point, but it cannot be doubted that steam transportation has increased the amount of teaming. At least, it has vastly increased the amount of transportation. I looked the other day at the first daily paper published in Illinois, and learned that it cost more in 1839 to haul corn eighty miles to a canal than it now costs to send it to New York by rail. About 200,000,000 tons of freight are annually transported in this country, all of which quantity has to be hauled to and from depots and landings by horses. Is it conceivable that such a mass of freight would ever be moved by horse power alone? Is it conceivable that in the absence of steam the building of wagons would have employed more men than are now employed in building locomotive engines and cars?

In a paper read a year ago before the Boston Society of Civil Engineers, the Hon. Edward Appleton showed that it would require 1,500,000 horses to do the work of locomotives in Massachusetts. Col. Carroll D. Wright of Boston showed in a paper read last May before the American Social Science Association that this would involve the employment of 400,000 men, would involve an addition to the population of the state of 1,500,000 persons, and would cost $450,000,000 for work now done by 7,000 men with locomotives for $20,000,000. Mr. Wright then says:

"To produce the goods now manufactured annually by Massachusetts, and to carry on the work of her railroads, without the employment of labor-saving machinery and steam power, would require a population of 9,000,000 in place of 1,650,000 as at present, and this by a low grade of labor. * * * This vast estimated population of 9,000,000 in Massachusetts would be required to produce what is now produced, and to be supported on present means. I leave the man who cries out against labor-saving machinery to contemplate the results."

The census returns indicate that in 1850 the manufacture of carriages and wagons employed 15,590 men, while in 1870 it employed 54,928. During the same period the number of horses in the country increased not so rapidly, but yet largely, from 4,336,719 to 7,145,370. The number of carriage and wagon makers increased over 200 per cent., while the population increased about 66 per cent. This does not indicate that the railroad has rendered teaming obsolete. In 1850, 1,554 persons were reported as engaged in building railroad cars. In 1870, 15,931 were reported in building and repairing the same. In addition to this it must be remembered that the building of our railroads cost about $4,000,000,000, most of which was expended in the employment of labor. So much for the displacement of labor by the railroad.

Mr. Moody is not more fortunate when he speaks of the destruction of our domestic manufactures by our factory system. Undoubtedly it was impossible for home-made cloth to compete in the open market with factory cloth. But the low price of factory cloth could never compel farmers' families to desist from making cloth for their own wear. The farmers' wife and daughters have to be maintained anyway. Their maintenance costs no more when they spin and weave than when they don't.

They have abandoned weaving, not because they can't compete with steam looms, for the element of profit doesn't enter into the case at all, but simply because they prefer to save themselves the trouble when they can buy cloth cheap. Mr. Moody is very excusable for weeping when he sees the farmer's daughter operating on the piano instead of the less noisy spinning wheel. But he need waste no sympathy where none is desired. She has left the spinning wheel not because she was driven away by factory competition, but because the introduction of agricultural machinery enables her father to buy cloth for the family, and in addition thereto, to buy a piano for his daughter to kill time and murder music with.

The result of some study of the census returns for an answer to the question how machinery affects laborers is herewith submitted. It is not so demonstrative in character as could be wished. Incompleteness of returns and differences of classification make some comparisons unsatisfactory. But these returns are our only sources of information and they must be approximately correct.

In 1840, 28 per cent. of the total population was engaged in some form of labor. In 1870 this percentage had risen to 32.4. In England in 1841 the percentage was 41.5, and it was about the same in 1871. As machinery in most cases makes labor lighter and simpler, the working people become self supporting earlier and remain so later. In England, where the manufacturing outnumber the agricultural classes, the proportion of the total population which is employed is larger than in this country where the agricultural outnumber the manufacturing classes. The percentage of our total population which was engaged in manufactures and mining was 4.7 in 1840 and 7.03 in 1870. From 1840 to 1850 the population increased 35.83 per cent., and the number of persons engaged in manufactures and mining increased only 18.6 per cent., or only half as fast. But from 1850 to 1870 the population increased 66.2 per cent., and the number of persons engaged in manufacturing and mining increased 183 per cent., or nearly three times as fast as the population. In this comparison the figures for 1870 are taken from the tables of occupations. For reasons explained by Gen. Walker they are fuller than the tables of industries. But making the comparison with the latter, to be on the safe side, we find that the number of persons engaged in manufacturing and mining increased fully two and a-half times as fast as the population did.

In 1850 out of every $100 worth of manufactured goods, $23.04 represented the cost of labor, $54.46 the cost of materials, and $22.50 the operating expenses and the profits on capital. In 1870 $18.53 represented the cost of labor, $58.79 the cost of materials, and $22.88 the operating expenses and profits. Here is a fall in the proportionate share of labor, but the gain of capital was but one-third of one per cent., and the increased cost of raw material consumed the difference.

The average wage in 1850 was $247.39, and in 1870 (mining excluded) $377.59. The increase in the total amount of wages paid was 227.6 per cent., and the increase in the average wage was 52.63 per cent. At the same time there was a marked rise in the cost of living. Given amounts of twelve staple commodities which in 1850 cost $100, in 1870 cost $176.44. But this greatly overstates the increase in the cost of living. Most of these twelve articles are raw materials, such as rise most rapidly in price as a country becomes more thickly settled. There was a marked fall in the price of many manufactured goods. There was a fall in the price of wheat, a very slight rise in the price of beef, and the rise in wool was less than 50 per cent. Gen. Walker's estimate of the average rise of prices from 1860 to 1870 is 56 per cent. Taking into account reductions in many classes of manufactured goods, if we estimate the rise in the cost of living for the working classes from 1850 to 1870 at 50 per cent., or a little less than the average rise of wages, I think we are quite liberal enough. If the cost of living increased much faster than the average rate of wages, there would be an increased demand for cheap articles of food that would become apparent in the returns of agricultural products. No such thing is indicated. While the population increased 66.2 per cent. the value of slaughtered animals increased 260 per cent., the wheat crop in bushels increased 187 per cent., while the Irish potato crop increased only 118 per cent., the corn crop 28 per cent., and the rye crop 14 per cent.

The per capita consumption of meat and wheat bread by the well-to-do classes is not apt to increase much. Only since 1870 have our exports of meat amounted to much, or our exports of wheat much exceeded 10 per cent of the crop. So the conclusion is justified that in 1870 the laboring classes in the aggregate lived rather better than they did in 1850.

It seems quite certain that the average wage in 1870 is reduced by the fact that a larger proportion of women and children were employed in factories in that year than in 1850, but the returns do not enable us to make a comparison.

In many trades where machinery has been introduced largely there appears an increase of average wages above 52.83 per cent. If that is the average increase there must be an increase much short of that in many other occupations. There are only two such in the fifteen industries examined in some detail, and this suggests that the deficit is to be found in the mechanical trades which were not investigated, because in them machinery plays a comparatively subordinate part.

The figures in the table on page 15 are calculated from the returns in the census reports for 1870. In most cases table VIII has been used, but table X has been used when it afforded the means of making a more perfect comparison.

While the ratio between the increase in the number of persons employed and the increase in the average wage paid is not very constant, it is worth notice that in many industries they vary inversely. In boot and shoe making the increase in the number of hands employed was low, 28 per cent., while the rise of wages was high, 84 per cent. In iron casting the number of persons employed increased more rapidly, 121 per cent., while the advance in wages was less rapid, 65 per cent. In machinery the increase in the number of hands employed was yet more rapid, 200 per cent., while the advance of wages was even more moderate, 52 per cent. In the making of mens' clothing there was a very trifling increase in the number of persons employed, and an exceptionally rapid rise in the average wage paid. In the manufacture of agricultural implements and sewing machines the increase in the number of persons employed was most marked, while the advance of the average wage was quite moderate. In ten years the number of persons

INDUSTRY.	AVERAGE WAGE, 1850.	AVERAGE WAGE, 1860.	AVERAGE WAGE, 1870.	PER CENT. OF INCREASE OF WAGE.	PER CENT. OF INCREASE IN HANDS EMPLOYED.	PRODUCT PER HAND EMPLOYED, 1850.	PRODUCT PER HAND EMPLOYED, 1870.	PER CENT. OF INCREASE OF PER CAPITA PRODUCT.	PER CENT. OF INCREASE OF TOTAL WAGES PAID.	PER CENT. OF INCREASE OF COST OF MATERIALS.	PER CENT. OF INCREASE OF VALUE OF PRODUCT.
Agricultural implements	$300		$481	60	250	$ 941	$2062	119	460	778	661
Boots and shoes	205		378	84	28	513	1337	160	144	292	211
Iron castings	340		562	65	121	1131	1946	72	358	465	396
Cotton goods		$196	288	47	*47	377	825	114	‡63	221	171
Carpets (all)	201		344	72	133	873	1482	69	287	357	321
Carpets (other than rag)		231	387	67	83	†1176	1800	‡53	‡203	‡207	‡176
Leather tanned and curried	249		392	57	37	1670	4555	173	115	366	272
Grist mill products	243		249	25	50	5837	7613	30	156	225	227
Lumber sawed and planed	249		282	13	110	1120	1585	41	254	380	330
Machinery	345		525	52	200	1004	1659	65	355	388	395
Musical instruments	452		712	57	110	1108	1940	75	400	600	440
Mens' clothing	155		286	87	10	500	1383	176	103	234	205
Sewing machines		476	705	48	217	†1853	1933	‡4	‡370	‡371	‡231
Woolen goods	159		342	115	75	1100	1941	76	272	275	279
Worsted goods		229	338	48	443	†1561	1710	‡9	‡700	‡486	‡497

* Since 1850. † These figures are for 1860. ‡ Since 1860.

employed in worsted mills increased 443 per cent., but the advance of wages was not so rapid as the advance in the cost of living.

It appears then that during a period of twenty years, when vast sums of money were being invested in machinery, and the productive capacity of each employé was being greatly increased, the number of persons employed in manufactures increased nearly three times as fast as the population did, and the average rate of wages increased faster than we are justified in estimating the increase of the cost of living.

Information later than 1870 is not very abundant, but it appears that the factories of Rhode Island employed 49,417 persons in 1870, and in 1875, two years after the panic, they employed 56,540 persons, an increase of 14 per cent., and the total amount of wages paid increased quite as fast. The cotton mills of Massachusetts employed 43,512 persons in 1870, and 60,176 in 1875.

The Chicago Stamping Company state that they employ 25 per cent. more hands on account of the reduction which improved machinery has enabled them to make in their prices.

The Chicago agent of the great stove founders, Perry & Co. of Albany, is authority for the statement that the public demand for handsome stoves, on which there is a great deal of hand work, has increased within twenty years the number of persons employed in making $1,000,000 worth of stoves from 500 to 1,300.

The owner of a stone-yard in Chicago states that the invention of sawing stone by steam has increased the number of men employed in stone-yards, because it has reduced the cost of and increased the demand for stone fronts.

The New York Bulletin last fall investigated the condition of labor in New York City. Taking large establishments in twenty-one lines of manufacturing, it found that where 7,578 persons were employed in October, 1873, 8,877 were employed in October, 1878. This is an increase in the number of hands employed of over 17 per cent., in spite of hard times. The average weekly wages in 1873 were $19, or reduced to a gold value, $16.72. The averaged wages in 1878 were $13, but the cost of living had fallen even more.

The reduction of wages from $19 to $13 is a reduction of 31 per cent., but the Massachusetts Bureau of Labor Statistics has shown that the reduction in prices from 1872 to 1878 was 54 per cent. on the latter prices. To put it in another form, while the wages had diminished from $19 in 1873 to $13 in 1878, the goods that would have cost only $19 in 1872 cost only 12.33 in 1878.

In a recent magazine article, Mr. Burke, who has been officially connected with Lowell cotton mills since 1836, is quoted as stating that, comparing 1878 with 1838, the wages of women had increased 40 per cent. and the wages of men 30 per cent., while the hours of labor had been reduced about 20 per cent., or from 76½ to 60 hours per week, and the price of cotton goods had decreased more than 30 per cent.

In a report made to some English merchants and manufacturers, Mr. B. F. Nourse, than whom there is no higher authority in the country on cotton manufacturing, states that while one pound of cotton made only 3½ yards of cloth in 1860, it made 4¼ in 1870 and 4½ in 1878. The production per capita, says Mr. Nourse, has increased 50 per cent. for the coarser fabrics, and 60 to 65 per cent. for the finer. The weekly earnings of operatives were from 10 to 25 per cent. higher than in 1860, while the cost of living had decreased.

Mr. Nourse is in error in supposing that the cost of living has diminished since 1860. After a very thorough investigation of this subject, Col. Carroll D. Wright makes the following statement in the last report of the Massachusetts Bureau of Labor Statistics:

"To sum up the result of our investigation as regards wages and prices in 1860 and 1878 may be stated as follows: That the average weekly wages of workingmen in manufacturing and mechanical industries in Massachusetts, allowing for the advance in the cost of living, were 10 per cent. higher in 1878 than in 1860, no account being made of the fact that in 1878 were paid for fewer hours of labor per week, in many industries, than were required in 1860."

The report shows an increase in the cost of living of 14 per cent., and in the rate of wages of 24 per cent.

It is on the boot and shoe business that the opponents of machinery manifest a disposition to make a particularly severe fight. Between 1850 and 1870 the increase in the number of persons employed in this industry was only 28 per cent., but the increase in the average wage was 84 per cent. The increase in the whole amount of wages paid was 144 per cent. In an argument in 1878 before the Committee on Patents of the House of Representatives, Mr. J. J. Storrow stated that before machinery was introduced the women who sewed the "uppers" together got fifty cents a day. At the time of the argument they got $1.33 a day. During the same period the wages of the men employed rose from $1.12 to $2.50 a day. At the same time the quality of the shoes had improved 25 per cent., the cost of leather had increased from 40 to 70 per cent, and the style of women's gaiter boots, which sold between 1850 and 1855 for $2.25, sold last year for $1.50. In 1855 a female employé worked four days and a half for a pair of gaiters. In 1878 she got a better pair of gaiters, though the price of leather had risen, for the work of a little more than a day. Thus does machinery economize production.

Both Queen Elizabeth and James I refused to grant a patent for a stocking frame, invented by a man named Lee, lest it should throw the hand knitters out of employment. Knitting is now done by machinery. The number of persons formerly and now employed in knitting cannot be stated, but in the speech already quoted from, Mr. Storrow quotes the report of a Congressional committee on the Marshall knitting machine, used chiefly for Shaker socks and Cardigan jackets. The committee reported that about 3,600,000 pairs of these socks were made per annum. By hand a woman could knit four pairs a day, for which she received 33 cents; by the machine she could make twenty pairs, and earn $1.33 per day. On a hand-frame a man could make five jackets a day at a cost of 58 cents; with the machine a girl can make forty-eight in a day, for which she receives nearly $1.50. Of these jackets 2,400,000 are made annually.

In 1830 the number of persons employed in the paper mills of this country was 10,000. In 1860 it was 22,000 and in 1872 it was 30,000, the rate of increase for 12 years being nearly 37 per cent., and the increase of population for ten years being

22.65 per cent. In 1800 it required three months to convert rags into paper. Now twenty-four hours suffice.

Appended to Prof. Leone Levi's lectures on "Work and Pay" is a table showing the average expenditure at different dates of a Manchester operative and his wife and three children.

It appears from this that the cost of living was reduced from 34s. 0½d. per week in 1830 to 32s. 2d. in 1875. The reduction is very slight, but the average weekly earnings of steam engine tenders rose from 24s. in 1839, to 32s. in 1873. The earnings of warehousemen rose in the same period from 18s. to 26s.; of card stretchers from 7s. to 12s.; of strippers, who are women and youths, from 11s. to 19s.; of male spinners, from 16s. to 25s.; of piecers, who are women and youths, from 8s. to 16s.; of throttle reelers, women, from 9s. to 12s. 6d.; of overlookers, from 24s. to 32s., and so on.

It is of importance to remember also, when the displacement of labor by machinery is spoken of, that the manufacture of machinery occupies 83,000 persons; the manufacture of agricultural implements and machinery, occupies 25,000, and the manufacture of sewing machines, 7,000. Nearly all of them are adult males, and, therefore, for the most part heads of families, and besides them is an army of men whom the invention of machinery employs in the forests, the mines and the shops, preparing the wood and iron for the makers of machinery.

But it is said that machinery is revolutionizing agriculture, converting our small farms into great estates, and dividing our farmers into a small class of landed aristocracy and a large class of hired laborers. There are two considerations that render this improbable. One is that farm machinery is portable, and can be used on ten farms of 100 acres each nearly as efficiently as on one farm of 1000 acres. The other is that no amount of competition can ruin a farmer. He can eat what he produces in which respect he has the advantage over the mechanic and the operator. The small farmer may not be able to sell grain low enough to compete with the large farmer, but he can always afford to raise food enough for himself and family and stock, and a little to exchange for clothing and other necessaries, though they may be of a coarse quality. It must be remembered that, economically speaking, the chief end of man is not to accumulate wealth but to get a living.

A good deal has been said recently of this tendency of farms to diminish in number and increase in size. I find, however, from the census that in the United States the average farm contained 203 acres in 1850, 199 acres in 1860, and a 153 acres in 1870. This may be said, and with some truth, is the result of cutting up the southern plantations into small farms. On the other hand, farms in some of the New England states have been increasing in size. Farmers have sold out to their neighbors and gone west. A good deal of poor land has been abandoned. In Massachusetts where farms are increasing in size the percentage of unimproved land is also increasing. Corn can be raised in Illinois and carried to Massachusetts cheaper than it can be raised there. New England farmers, not being protected by a tariff, are being driven out of the business by cheap Western grain. Horace Greeley saw the wheat raising of Vermont ruined by Western competition, and instead of demanding a tariff, he told the Vermonters in 1872, that if they could buy wheat cheaper than they could raise it they had better buy it.

Leaving out the Southern States and New England, do these figures look as if we were in immediate danger of a farm-machine-made landed aristocracy? The size of farms in Indiana has diminished from 136 acres in 1850 and 124 acres in 1860 to 112 acres in 1870. In Kansas the decrease has been from 171 in 1860 to 148 in 1870. In New York the average size of farms at the three periods was 112, 106, and 103 acres. In Pennsylvania it was 117, 109, and 103 acres. In Ohio it was 125, 114, and 111 acres. In Wisconsin it was 148, 114, and 114 acres. In Michigan it was 129, 113, and 101 acres. Nor has the tendency been checked. The state census of Michigan shows that the average size of farms in 1874 was only a fraction over 90 acres. In Illinois the average number of acres in a farm was 158 in 1850, 146 in 1860 and 128 in 1870.

The number of farmers and farm loborers in the great reaper and mower using states increased over 50 per cent. between 1850 and 1860, and about 30 per cent. between 1860 and 1870, which is faster than the population of the country increased.

This labor problem, it must be remembered, is a problem of population. The French proverb is that where two workmen run after one master, wages are low, and when two masters run after one workman wages are high. Not only does our population tend to increase by natural process faster than in European countries, but immigrants have poured in upon us by the million. Shutting our eyes to the fact that the vast stream of immigration was filling up the country, and hastening the day when population would crowd close upon the means of subsistence, we refused to see in immigration anything but an unmixed blessing, until there became apparent on our Western horizon a cloud about the size of a Chinaman's hand. And even now the alarm is not taken by Americans, who might be supposed to have some inherited rights in this country. It is Castle Garden that has avowed its hostility to the Golden Gate.

Between 1850 and 1870 more than 5,000,000 immigrants poured into this country. That is a pretty severe strain to put on the productive system of this country. But that is not the worst of it. About 47 per cent. of the immigrants located themselves in the New England and Middle states, where population was already the densest, and the difficulties of getting a living were the greatest ; and 53 per cent. went to all the other points of the country,—southward to the Gulf of Mexico and westward to the Pacific ocean. And these immigrants were, and are still, prolific. Some Massachusetts statistics show that in an equal number of Americans and foreigners there were two marriages among the latter to one among the former, and two children to each marriage among the latter to one for each marriage among the former. Did our productive system break down under the strain ? Not at all. It was our machinery that made this country a field of labor attraction to the peasants and workmen of Europe.

Had our population remained nearly stationery while the inventor was vastly increasing the economic value of each laborer, we are justified in assuming that wages would have advanced beyond the dreams of any sane social reformer.

These considerations and a contrast between the condition of the working classes in countries where machinery is used with the condition of those classes in countries where machinery is not used extensively, justify the statement that machinery enables a given territory to support a larger population on a given scale of comfort than would be possible in its absence.

The socialists quote the statement of Mr. John Stuart Mill, that it was a question if all the mechanical inventions yet made had lightened the day's toil of any human being. They had only enabled a greater population to live the same life of drudgery and imprisonment, and an increased number of manufacturers to make fortunes.

That machinery has not lightened the day's toil of any human being seems an unwarranted statement in view of the fact that in proportion as machinery has been introduced the day's labor has been shortened, and the day's labor is shorter in countries where machinery is used than in countries where it is not used. In regard to lightening toil, it is pertinent also to observe that weaving and many other mechanical operations require less strength when machinery is employed than otherwise.

Mr. Moody, who is hostile rather than friendly to machinery, and whose admissions in favor of machinery are, therefore, important, uses the following language :

" When man was dependent upon his own muscle and the use of the most crude tools or implements in the production of food, clothing and shelter, necessarily the operations were slow and toilsome, requiring, in those parts of the earth subject to long seasons of alternate heat and cold, almost constant, unresting labor. Thus we find that, previous to the present century, our ancestry, both young and old, were compelled to a daily toil often equal to and exceeding eighteen hours a day. Many now living can remember when fifteen and sixteen hours a day were deemed a regular day's work, and none were idle. But as tools were improved and facilities were increased, these extra hours were relaxed, and some leisure was found, greatly to the advantage of all. The introduction of new forces,—horse powers, water powers, etc.,—still further relaxed the toil and added to comfort and advancement. With the advent of steam power and machinery, by common consent the hours of labor were soon reduced to twelve. Then commenced the rapid development of the general revolution in all the methods of production, which has culminated in universal distress, for the simple reason that man after reducing his hours of labor to ten a day, has then ceased to further modify and regulate his daily hours of work."

So much for Mr. Moody. The report of the Massachusetts Bureau of Labor Statistics for 1872–73, publishes statements from a number of old mechanics as to the hours of labor and the style of living in Massachusetts early in this century, before the advent of machinery on any considerable scale.

C. B., a carpenter, aged 70, says from sunrise to sunset constituted a day's work the year round. If necessary, work was extended till 8 P. M. This rule applied to blacksmiths, masons, and others as well as carpenters. Farmers' wives milked their cows and had them in the pasture before sunrise, and while the men were at work before breakfast. Some men from another town were to work for a Quaker in Danvers. They drove over, reaching Danvers by sunrise, but the Quaker sarcastically asked them why they didn't come during the forenoon. A carpenter having work in Salem, but living six miles away, walked to and fro from his work every morning and night. If an apprentice accumulated $10 or $15 by the time he was 21 years old he had quite a little fortune. Food was very plain. The people ate coarse brown and barley bread with large quantities of mush. Very little flour bread was eaten. What was eaten was bought once a fortnight of a baker who drove around to his customers. Common vegetables and fresh and corned meats made up the bill of fare. Side dishes and the like were never seen. Furniture was scanty and uncomfortable. No carpets, sofas, lounges, centre-tables or musical instruments were seen.

B. F. B., of Salem, says that in his youth the hours of mechanical labor were from early candle-light to 8 P. M. summer and winter. Furniture was plain, scarce and costly. Every piece was dispensed with that could be. Flour bread was a luxury.

J. S , a mason, aged 83, of Salem, says that the hours of work used to be from daylight to 8 P. M. in summer, and from 8 A. M. to 5 P. M. in winter. Wages for masons were $1.25 a day in summer and $1 in winter. There was little chance to lay up money. Apprentices fared roughly in those days as compared with the present.

In his book on "Workmen and Wages," Mr. Ward prefixes to some tabular statements this declaration: "We have here the indisputable data showing that a gradual rise of wages has been concurrent with a gradual reduction of the hours of labor, and a gradual, but decided, fall in the price of food."

It appears to be admitted by Mr. Mill that machinery has enabled a larger number of persons to get a living on a given scale of comfort than could get a living otherwise. Now if this excess would have been born anyway, machinery has benefited laborers in affording some a living who could not have gotten it otherwise. If this excess would not have been born under a hand labor régime, then machinery has given the laborer this benefit, that it has enabled him to surround his hearth with more olive-branches than would have been practicable without it. If machinery enables a larger number of persons to get a living, it is implied that it would have enabled a stationary number to get a better living. Now one of the saddest things about this labor problem is the disposition of the human race to multiply faster than the means of subsistence, and it sometimes looks as if the poorer the parents were, the more recklessly they increased the population, but hardly anything irritates the wage-receiving classes more than to talk to them about the laws of population. If, as seems to be the case, population increases just as fast as machinery increases the demand for labor, then no great improvement in the condition of the laboring classes is possible.

But there is a dark side to this matter. Mr. Moody has cited some veritable cases of the displacement of labor by machinery. But these cases have all occurred very recently. Mr. Moody mentions a Philadelphia yarn mill where the number of employés has been reduced without decreasing the product, and he shows that while the population of Massachusetts increased 30 per cent. between 1865 and 1875 the number of persons employed in fifty-five industries increased less than 15 per cent. There is no doubt that our manufacturing interests are depressed, and that the times are by no means so good as they were a few years ago.

There are several causes for the present depression, and among them is not to be counted the contraction of the currency which ceased five years before the panic, except in so far as the ordinary course of business—the wants of trade that we hear so much about—retired the currency. Nor are we to count the legislation in favor of the rich man and against the poor man. There has been no such legislation, though some persons regard a law permitting a foreclosure of mortgages as the result of the tyranny of the money power, and look on a judgment note as the French peasantry used to look on the *corvée* or the salt tax, and the sovereign state of Missouri, acting in behalf of the poor man, has lately passed a law which will make it impossible for counties to pay either principal or interest of their debts ; while Indiana has decided to confiscate the claims of foreign corporations that resort to the federal courts for the protection of their rights. The trouble lies elsewhere.

Business depression is world-wide at the present time, and the Republican party can hardly be responsible for all of it. The inhabitable part of the world is filling up with people. There is no Australia, there is no California, there is no great West now as there was in 1850. England and the United States are not likely ever again to grow as fast as they did between 1850 and 1870.

Of local causes of depression, a prominent one is that between 1865 and 1873 a great deal of money was borrowed and expended on works that proved worthless. When the time came for paying back the borrowed money, the debtor found himself ruined, and the consequence was frequently the ruin of creditor also.

A third cause is, in the present discussion, the most important of all. We have disturbed the equilibrium of production. We have strained every nerve to build up manufactures and have left agriculture to take care of itself. All went well till our labor market was well supplied, and then we found that we had more mills and furnaces than the home market required, and we were shut out of foreign markets, chiefly because our tariff advanced the cost of raw materials and the other items of expense of manufacturing. The result was that many establishments had to close for want of business.

Our tariff, which began at less than 8 per cent. rose with little interruption except during the compromise period, till in 1868 it reached an average of 48.05 per cent. on dutiable goods and 44.25 per cent. on all imported goods. Of course this built up manufactures. It built up cities where there is no original production of wealth. In the Eastern states the proportion of urban to total population rose from 14.9 per cent. in 1840 to 34.4 per cent., 1870. In the Western states the proportion of urban to total population rose from 1.8 per cent. in 1840 to 14.5 per cent. in 1870. In the Southern states the rise was from 3.5 per cent. to 6.9 per cent. 1840 21.8 per cent. of the total population was engaged in agriculture. In 1870 the percentage had fallen to 15.3. In the same period the number of persons engaged in manufactures and mining increased from 4.7 per cent. to 7.03 per cent. of the total population, and the number of persons engaged in trade aud transportation increased from 1.2 per cent. to 3.09 per cent.

The value of our manufactured goods, per capita, increased from $44 in 1850 to $65 in 1860, and $128 in currency in 1870.

All this was well enough so long as the market lasted. But the population has not increased in any such ratio, and the foreign market has never been open to us on any scale. Mr. Moody is no free trader, and he says we do not export more than five per cent. of what we manufacture, and perhaps not more than two per cent. We are now congratulating ourselves over our large exports, but those exports are not manufactured goods. Last year our exports were nearly $700,000,000. Manufactures of cotton reached to about 1.5 per cent. of this. Iron and steel and manufactures of them, including locomotives and other machinery, edge tools and fire arms, amounted to 2.28 per cent., and leather and manufactures of leather, to 1.16 per cent. On the other hand, raw cotton formed 26 per. cent of the whole, breadstuffs 26.12 per cent. and provisions 17.76 per cent. It is not singular that our manufactures should be in a depressed state.

But while the times are hard their hardness is often exaggerated. Expensive operatic and theatrical companies go through the country reaping ample harvests. The half dollars of the multitude pour in great quantities into circus coffers. There is a saloon in Chicago for about every thirty-five adult males, although a good many adult males never drink. The Socialistic demonstration in the exposition building in Chicago in March, directly and indirectly drew a good deal over $15,000 from the pockets of the people who demanded legislation to ameliorate their condition. Of the thousands of people who were present there was hardly a man or woman who was shabbily dressed or who looked pinched. With rare exceptions the men smoked cigars in preference to pipes, and the women wore ornaments. The number of persons out of employment has been greatly over-estimated. Mr. Moody says frankly that he adopts the 3,000,000 guess because he has no information. But since he wrote his pamphlet, Massachusetts has taken a census of her unemployed citizens. About one person in eighty was last year found to be out of work. This ratio would give for the United States about 562,000. But Massachusetts is distinctively a manufacturing state, and she must have a much larger percentage of unemployed persons than agricultural states have. Allowing for this it appears that 500,000 is a liberal estimate of the whole number of unemployed persons in the United States. But in Massachusetts it was found that one fourth of the unemployed persons were voluntarily idle, vagrants by choice. Carrying that ratio through the country we conclude that in the United States there are not over 300,000 men and 75,000 women desirous of work and unable to get it. Such figures are serious enough, but they do not justify any such attacks on our industrial system as some persons have made.

Mr. Moody's remedy for the present troubles is the shortening of the hours of labor, till all the persons out of work are provided with employment. He would begin with eight hours, and if that didn't provide all with work he would make it six. That is a purely arbitrary and legislative remedy for an economic evil, and contains as much sense as the prescription of a mediæval doctor. The remedy is absolutely incapable of application. To reduce the wages *pro rata* with the reduction of hours would be strenously resisted by the working classes. To prescribe that present wages shall be paid for less labor is to fix the price of labor by law, and if the human race is capable of learning by experience it must have learned by this time the impossibility of regulating prices by statutes. If a man can do more work in ten hours than he can in eight, employers will be willing to pay more for ten hours work than for eight, and if employers will pay for the extra two hours the men will work the extra two hours. Legislation has assisted in the reduction of the hours of labor from fifteen or sixteen to nine or ten. But the real reason why the working day has been shortened is an economic reason. Experience has shown that a man can not do good work when exhausted, and machinery has enabled men to earn such wages in ten hours that they do not feel it worth while to labor the extra two or five hours.

The report of the Massachusetts Bureau of Labor Statistics for 1872–73 states that some mills had tried the experiment of reducing the hours of labor from twelve to eleven or even ten and had found it profitable. The managers of the Pemberton mills ascertained by actual experiment that the last hour was the least profitable hour in the day.

Hand labor costs nothing for motive power, and though but little is accomplished during the thirteenth hour of a day's work that little is clear gain. In a factory if the thirteenth hour of a day's work is considerably less productive than any one of the first ten hours, an economic reason will exist for reducing the hours of labor and increasing the number of persons employed. If each hour of a thirteen hour day is less productive than each hour of a ten hour day that fact is more likely to be discovered by the manager of several hundred workmen than by each workman on his own account. This is probably the explanation of the reduction in the hours of factory labor that has occured.

Now if men can produce as much or nearly as much in eight hours as they can in ten, eight hours is destined to become the working day ; otherwise, not. The owner of a stone-yard in Chicago has stated that his men could do as much work in eight hours as in ten hours. Their work is fatiguing and little or nothing is gained by working the men over eight hours. Eight hours was the day's labor in that yard, and the owner said so far as his business was concerned the eight-hour question had solved itself. Precisely. If that question is ever solved, it must solve itself. No act of Congress will solve it. In May, 1878, Senator Voorhees presented in the United States Senate a petition from persons in New Jersey to have six hours made a day's work. Unless men can produce as much in six hours as they can in more, there is no reason for making the day consist of six hours rather than of four or two. The idea seriously put forward by some " reformers," that laboring men starve on ten hours work a day when they might live in plenty if they worked but two hours a day is so preposterous that it is difficult to see how a sane man can give it a second thought. Moore fixed on six hours as a day's work in Utopia. But Moore knew little of the effect of price on demand and the dependence of the employment of labor on demand for goods. Furthermore, he did not provide a saloon for every thirty-five male adults in Utopia.

If Mr. Moody undertakes to fix the price of labor, he must do more. He must fix the price of manufactured goods, and then he must compel the public to buy a certain quantity of goods at those prices. Otherwise, about the time he has by his sliding scale of hours provided everybody with work, he will find all the mills and furnaces going out of business, because they can not sell their goods for enough to cover the cost. At a time when manufactures are depressed, and some manufacturers have sold their goods at a loss rather than stop work, Mr. Moody invents a remedy which consists of increasing the cost of labor, and he appeals to manufacturers to say if it is not true that they made the most money when they paid the most wages. It is easy to understand how high profits cause high wages, but how high wages can cause high profits is not obvious.

If our trouble has been correctly diagnosed, the remedy has already been suggested. We have disturbed the equilibrium of the productive forces, and now we must restore it. We have been fostering manufacturers ; now we must foster agriculture. We must give the country a chance to catch up with the city. We must reduce our manufacturers or increase our market. The former remedy is now in operation. Many of our manufacturing establishments are closed or are doing a reduced business. But another fact is well worthy of notice. The number of homesteads pre-empted in the first half of 1878 exceeded those pre-empted in the whole of any one of the four preceding years. Going west will settle the matter for the present if the operation is carried far enough. Farmers may not get rich, but they have permanent situations and they must buy some manufactured goods.

The other remedy is to increase our market, in other words, extend our export trade. This is not to be accomplished by taxing the nation to pay the freights for the manufacturers even if it is disguised as a postal contract. It is to be accomplished by cheapening raw materials and providing return cargoes for the vessels that carry our goods abroad. We shall find it profitable to import raw material and export manufactured goods. Mr. Swank, secretary of the Iron and Steel Association, states that at the close of 1877 we had 446 furnaces out of blast and 270 in blast. We certainly can't export the product of those furnaces, for Mr. Swank shows that English pig iron can be laid down in New York @ $9.62½ and $11.62½ per ton, while the price of American pig iron ranges from $16 to $18 50. We have to protect ourselves with a duty of $7 per ton, and Mr. Swank says he can't spare a cent of that. We can't do much for the pig iron business, but what we can do is to abandon it, take our pig iron at a saving of $7 a ton, work it up and export the product. We should have the benefit of cheap iron ourselves, and our iron export trade would employ the men thrown out of pig iron making. Take steel. Mr. Swank tells us we ought to be profoundly grateful to the protective tariff for reducing the price of steel rails from $110 to $45.50 per ton, and then shows that English steel rails are sold at $27.37, and that not a cent can be taken off our duties of $28 per ton. It appears, then, that instead of reducing the price of rails the tariff raises their price from $27.37 to $45.50.

But while we can't export pig iron and steel rails, because without the tariff we can't even hold our home market, yet in spite of the English competition we can export the finer manufactures of iron and steel, handicapped as we are by the high prices of raw materials. Last year we exported machinery worth $5,000,000; fire arms worth $2,000,000; edge tools worth $1,000,000, and sewing machines worth $1,660,000. This indicates where our strong point lies. If we could get cheap iron and steel we could put the prices of our manufactures down so low as to drive England out of the markets of the world.

In 1771, when our iron trade was in its infancy and our manufactures met with governmental hostility instead of protection, we exported to England 5,303 tons of pig iron and 2,222 tons of bar iron. But now, after a century of nursing, our iron industries are able to hold the home market only with the help of customs duties ranging upwards from 75 per cent. Though the most carefully protected of our important industries, it has for years been the most completly prostrated of them all, for the costly wall erected to protect it from foreign competition has effectually shut it out of foreign markets.

The period from 1846 to 1860 was our low tariff period, and it was very far from being a period of depression. It is generally described as a period of great prosperity. Our exports of manufactured goods were 28 cents *per capita* of the population in 1821; 51 cents in 1825; 41 cents in 1830; 51 cents in 1835· 58 cents in 1840; 53 cents in 1845. But in 1850 they amounted to 60 cents, in 1854 to $1.40 and in 1860 to $1.53, the highest point they ever reached until since the panic of 1873, when reductions in wages, the very thing the tariff was to protect our laborers against, enabled our manufacturers to increase their exports.

If the exported manufactures be compared with the total manufactures, our exports are now *pro rata*, far below what they were during the period named. In 1860 the total manufactures *per capita* were $65. and the exported manufactures were $1.53. Our total manufactures *per capita* are now probably double those of 1860 in quantity if not in value, while the exported manufactures *per capita* have increased but a few cents.

Our exports of tanned leather increased three-fold in three years after we removed the duty from raw hides in 1872. Our exports of manufactured lumber were 50 per cent. larger in 1860, while Canadian lumber in the rough was admitted free of duty, than they were in 1875 when there was a tariff of 20 per cent. on Canadian lumber.

To admit Chili copper ore free of duty would injure our copper mining industry, but it would afford a wonderful stimulus to our copper and brass manufacturing industries, and would greatly increase our exports to Chili.

In 1874 the Argentine Republic imported 40,000,000 yards of cottons from England, and in 1875 it imported 155,000 yards from the United States. In 1874 that republic imported $990,000 worth of boots and shoes from England, and $10,000 worth from the United States. The chief export of the Argentine Republic is mestiza wool, which enters England free, and is barred out of the United States by an almost prohibitory duty.

At present we are hampering our manufacturers for the benefit of our miners for the simple reason that the manufacturers are not strong enough to alone maintain protection, so they make a compact with the miners and divide the plunder

This is not an argument for general free trade ; it is only an argument for the cheapening of raw materials for the benefit of our manufacturers and the public. A very moderate increase in our manufacturing business would provide employment for all the men thrown out of work by the proposed system. This is also an appeal in behalf of high priced labor. We want to encourage the trades that require skill and pay the laborer well, rather than other trades. In 1870 the average wage in copper mining was $500, but in copper manufacturing the average wage was $564, and in brass manufacturing $534. The average wage in iron mining was $455 ; in making pig iron, only $453 ; in making agricultural implements, $481 ; in making machinery, $525 ; in making rolled iron, $564 ; in making steel, $677, and in making sewing machines, $705.

Wool raising is the only agricultural interest that could be injured by admitting all raw materials duty free. In the manufacture of some fabrics a mixture of domestic and foreign wools is desired, so that to some extent the demand for domestic wool varies directly, and not inversely, as the importation of foreign wool varies.

The history of machinery seems to point to the following conclusions :

I. Machinery has reduced the cost of food, or at least prevented its rising with the increase of population, and has also reduced the cost of clothing and other manufactured goods, conferring two benefits upon the laboring classes.

II. The introduction of machinery has increased the demand for labor. The result has been the increase of the number of persons employed in excess of the increase of population, and an increase in the rates of wages beyond the increase in the cost of living.

III. Machinery has effected a marked reduction in the length of the working day and has reduced the amount of muscular exertion requisite in many branches of industry.

IV. In so far as machinery has conferred less benefit on American laborers than might have been anticipated, it is attributable chiefly to the fact that European laborers have poured into this country in a flood, especially since 1845, since which time the greatest advances in the introduction of machinery have been made.

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